***Chapter:*** **9.0 Implementation Stage**

***Description:*** Implementation of the product is initiated after all application testing has been successfully completed. This stage involves the activities required to install the software, databases, or data that comprise the product onto the hardware platform at the site(s) of operation. The activities associated with this stage should be performed each time the product is installed at a production site.

User training may be required to complete the implementation process. A description of the training necessary for developers, testers, users, and operations staff is provided in the Training Plan.

***Input:*** The following items provide input to this stage:

SEM Templates:

- Conversion Plan
- Installation Plan
- Maintenance Plan
- Training Plan
- Transition Plan

PMM Templates:

- Project Plan
- Quality Management Plan
- Security Plan

Other Inputs:

- Operating Documents
  - Users Manual
  - Developer's Reference Manual

***High-Level Activities:*** The remainder of this chapter is divided into sections that describe the specific high-level activities performed during this stage. These activities represent the minimum requirements for a large information systems engineering effort. *Notes* are provided, as applicable, to assist in customizing these lifecycle stage requirements to accommodate the different sizes of information systems engineering efforts. The high-level activities are presented in the sections listed below.

9.1 Perform Installation Activities
9.2 Conduct Installation Tests
9.3 Transition to Operational Status

***Touch Points:*** The following touch points are involved in the Implementation Stage:

- Contracts and Procurement
  - Contract Liaison involvement to close out all open contracts and/or purchase orders related to this systems development effort
- Security
  - Work with the MDIT Security Liaison to finalize and get final signoff of the Security Plan (DIT-0170)
- Other
  - Finalize the Business Continuity Planning process.

***Output:*** Several work products are produced during this stage. The work products listed below are the minimum requirements for a large project. Deviations in the content and delivery of these work products are determined by the size and complexity of the project. Explanations of the work products are provided under the applicable activities described in the remainder of this chapter.

SEM Templates:

- Conversion Plan (*final*)
- Maintenance Plan *(final)*
- Transition Plan (*final)*

PMM Templates:

- Project Plan *(final)*
- Post Implementation Evaluation Report (PIER) (*final*)
- Security Plan (*final*)

Other Outputs:

- Converted data or system files
- Installation Test materials
- Operating documents
- Operational software product

A diagram showing the work products associated with each SEM stage is provided in *Exhibit 9.0-1, SEM Overview Diagram.* The activities for this stage are emphasized in bold.

Review the Project Plan for accuracy and completeness of all Implementation Stage activities and make any changes needed to update the information.

***Review Process:*** Quality reviews are necessary during this stage to validate the product and associated work products. The activities that are appropriate for quality reviews are identified in this chapter and Chapter 2.0, Lifecycle Model. The time and resources needed to conduct the quality reviews should be reflected in the project

resources, schedule, and work breakdown structure.

**Structured Walkthrough (SWT)**
Requirements for a peer review or a more formal structured walkthrough are documented under *Review Process*, at the end of each Task, Subtask, or Activity section in this stage. The State of Michigan guide titled *Structured Walkthrough Process Guide* provides a procedure and sample forms that can be used for SWTs. This document is available on the MDIT SUITE website.

**Stage Exit**
Schedule a Stage Exit as the last activity of the Implementation Stage to enable the project approvers to review project deliverables and provide a concur/non-concur position to the project manager. The State of Michigan guide titled *Stage Exit Process Guide* provides a procedure and sample forms that can be used for Stage Exits. This document is available on the MDIT SUITE website.

***References:*** Chapter 2.0, Lifecycle Model, *Quality Reviews* provides an overview of the Quality Reviews to be conducted on a project.

***Bibliography:*** The following materials were used in the preparation of the Installation and Acceptance Stage chapter.

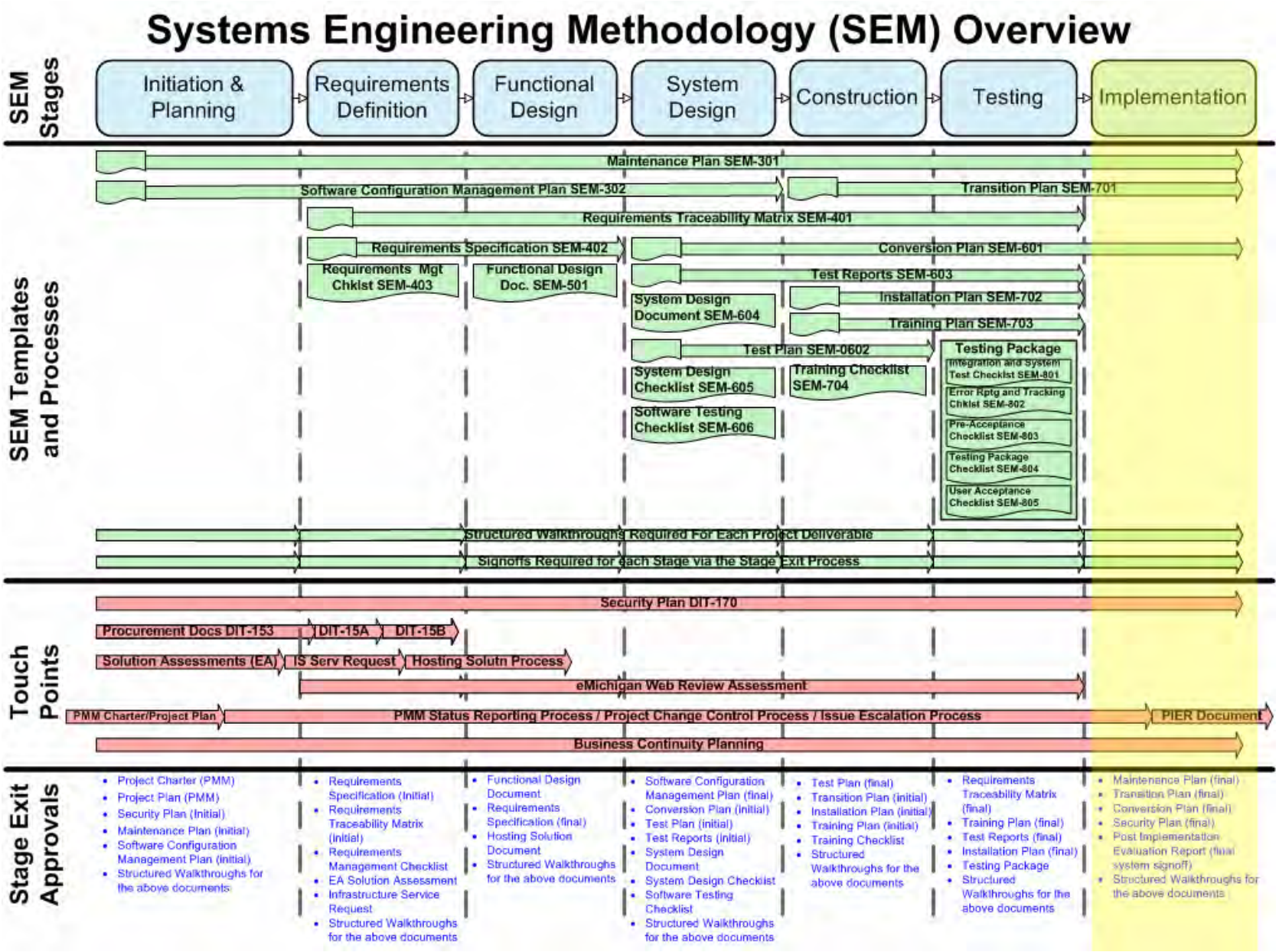
1. The Institute of Electrical and Electronics Engineers, Inc., *IEEE Standard for Developing Software Lifecycle Processes,* IEEE Std 1074-1991, New York, 1992.

2. U.S. Department of Commerce, National Institute of Standards and Technology, *Guide to Software Acceptance,* 500-180, Washington, D.C., 1990.

3. U.S. Department of Energy, *Automated Data Processing Systems Development Methodology, Volume 1,* K/CSD/INF/86-3, Vol.1, R3, prepared under contract by Martin Marietta Energy Systems, Inc, at Oak Ridge National Laboratory, August 1987.

4. U.S. Department of Energy, *DOE/NV Software Management Plan,* Nevada Operations Office, May 1991.

**Exhibit 9.0-1 SEM Overview Diagram – Implementation Stage Highlighted**



***Activity:*** **9.1 Perform Installation Activities**

***Responsibility:*** Project Team

***Description:*** The installation process involves loading, copying, or migrating the software and data, if required, to the production platform and the provision of operating documentation and other support materials at each site. The installation of firmware, hardware, and communications equipment may also be involved.

If a current system exists, implement system and data conversion in accordance with the procedures described in the Conversion Plan. Each data and file conversion should include a confirmation of data and file integrity. Determine what the output in the new product should be compared with the current system, and assure that the data and files are synchronized.

At each installation site, inspect the facility to assure that site preparation is complete and in accordance with the Installation Plan. Initiate any actions that are needed to complete the preparations. Conduct an inventory of all vendor provided hardware, software, firmware, and communications equipment.

Follow the procedure specified in the Installation Plan when installing the software, hardware, and other equipment. Monitor all installation activities including those performed by vendors.

***Procedure:*** Use the following procedure to perform the installation activities.

- Coordinate the installation with the system owner, users, operations staff, and other affected organizations.
- Ensure that any necessary modifications to the physical installation environment are completed.
- Inventory and test the hardware that will support the product. This inventory should be performed in advance of the planned installation date to allow time for missing hardware to be obtained and malfunctioning equipment to be replaced or repaired.
- If the product requires an initial data load or data conversion, install and execute the tested programs to perform this process.
- Install the software product onto the hardware platform.

**Activity:** **9.2 Conduct Installation Tests**

***Responsibility:*** Project Team

***Description:*** Ensure the integrity and quality of the installed product by executing the installation tests defined in the Installation Plan. Testing is performed to verify that the product has been properly installed and is fully operational and in production.

The installation test(s) are designed to validate all functions of the product and should specify a standard set of test results and tolerances. If the product being installed is a modification to an existing system, all remaining functions and code that may be affected by the new product should be tested.

Document any problems and identify corrective action. Select a diagnostic package that will pinpoint problems quickly and allow for timely corrections. Retest all equipment and software after a repair, replacement, or modification.

Certify each component on successful completion of installation and checkout. When installation is complete, rerun a portion or all of the system test and dry-run the acceptance test procedures to verify correct operation of the product.

Conduct installation testing to verify the following:

- Security functions
- Integration with the current software
- Interfaces with other systems
- System functionality based on the requirements

***Work Product:*** Place a copy of all Installation Test materials in the Project File.

***Review Process:*** Conduct structured walkthroughs of the Installation Test materials.

***Activity:*** **9.3 Transition to Operational Status**

***Responsibility:*** Transition Team

***Description:*** The transition of the product to full operational status begins after the formal acceptance by the system owner. Use the procedures described in the Transition Plan to implement the transition processes. Conduct or support stress tests and other operational tests. Determine product tolerances to adverse conditions, failure modes, recovery methods, and specification margins. Complete any training and certification activities. Ensure that support to be provided by contractors begins as planned.

The project team is usually expected to provide operational and technical support during the transition. Identify project team personnel with a comprehensive understanding of the product who can provide assistance in the areas of installation and maintenance, test, and documentation of changes. Technical support may involve the analysis of problems in components and operational procedures, the analysis of potential enhancements, and vendor-supplied upgrades to components (such as the operating system or database management system).

Transition to full operational status should be an event-oriented process that is not complete until all transition activities have been successfully performed. Withdraw the support of the project team personnel in a gradual sequence to ensure the smooth operation of, and user confidence in, the product. At the conclusion of the transition process, plan a formal transfer of all responsibility to the maintenance staff. This includes working with DIT Technical Services to add the application to the Configuration Management Data Base (CMDB) Application Board.

All Project File materials, operating documents, a list of any planned enhancements, and other pertinent records should be turned over to the maintenance staff. Access rules must be modified to provide access to the product by the maintenance staff and to remove access by the project team and other temporary user accesses. Programs, files, and other support software should be in the production library and deleted from the test library, where appropriate.

For major systems involving multiple organizations and interfaces with other systems, a formal announcement of the transition to production is recommended. The announcement should be distributed to all affected groups. The names and telephone numbers of the maintenance staff should be included.

***Work Product:*** The system is transitioned into operational status. Project File materials, operating documents, and other pertinent records are turned over to the maintenance staff.

***Review Process:*** All reviews related to the functionality were completed prior to the system being placed into operational status.

Page inserted for consistency in section start points.